

Replacement of refined grains with whole grains and risk of coronary heart disease



Monica L. Bertola¹, Kenneth J. Mukamal^{1,3}, Mary M. Franz¹, Qi Sun^{1,4}, Alan J. Flint^{1,4}, Kim Overvad⁵,
Walter C. Willett^{1,2,4}, and Eric B. Rimm^{1,2,4}

¹Departments of Nutrition and ²Epidemiology, Harvard T. H. Chan School of Public Health, Boston, MA; ³Department of Medicine, Beth Israel Deaconess Medical Center, Boston, MA; ⁴Channing Division of Network Medicine, Department of Medicine, Brigham & Women's Hospital and Harvard Medical School, Boston, MA; ⁵Departments of Public Health and Epidemiology, Aarhus University, Aarhus, DK

Background

- Whole grains are inversely associated with risk of coronary heart disease (CHD)
- Mechanisms include fiber content which lowers cholesterol levels
- 2010 US Dietary Guidelines recommend that at least 50% of grain intake should come from whole grains
- This implies a health benefit for the replacement of refined grains with whole grains on a national level

Objectives

- To examine whether the replacement of refined grains with whole grains is associated with a lower risk of CHD
- To examine the association between whole grain content of cold cereal, an important source of whole grains, and risk of CHD

Methods

Study Population

- 121,700 women in the Nurses' Health Study cohort (NHS, 1984-2012)
- 51,529 men in the Health Professionals Follow-up Study cohort (HPFS, 1986-2012)
- Participants with cardiovascular disease at baseline excluded

Exposure Assessment

- Usual diet self-reported using a validated FFQ every 4 years

Outcome Measurement

- CHD including nonfatal myocardial infarction or fatal CHD

Statistical Analysis

- Cox PH substitution models
- Time-varying exposure & covariates
- Cumulative average grain intake
- Results pooled using a fixed effects meta-analysis

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Results

Table 1. HR (95% CI) for CHD associated with the substitution of 16g (one serving) of refined grains with 16g of whole grains.

	HPFS n = 41,983 men 4,220 events		NHS n = 77,347 women 3,199 events		Pooled n = 119,330 7,419 events
	Model 1	Model 2	Model 1	Model 2	
<i>Total whole grains including added bran and germ</i>					
	0.88 (0.85 - 0.92)	0.93 (0.89 - 0.96)	0.85 (0.81 - 0.89)	0.90 (0.86 - 0.95)	0.92 (0.89 - 0.95)
<i>Total whole grains excluding added bran and germ</i>					
	0.89 (0.86 - 0.93)	0.93 (0.89 - 0.97)	0.89 (0.84 - 0.94)	0.94 (0.89 - 0.99)	0.93 (0.89 - 0.96)
<i>Milled (processed) whole grains only</i>					
	0.89 (0.84 - 0.94)	0.94 (0.88 - 0.99)	0.76 (0.70 - 0.82)	0.86 (0.79 - 0.93)	0.91 (0.87 - 0.95)
<i>Intact (nonprocessed) whole grains only</i>					
	0.86 (0.79 - 0.94)	0.91 (0.84 - 0.99)	0.93 (0.83 - 1.04)	0.93 (0.84 - 1.04)	0.92 (0.86 - 0.98)

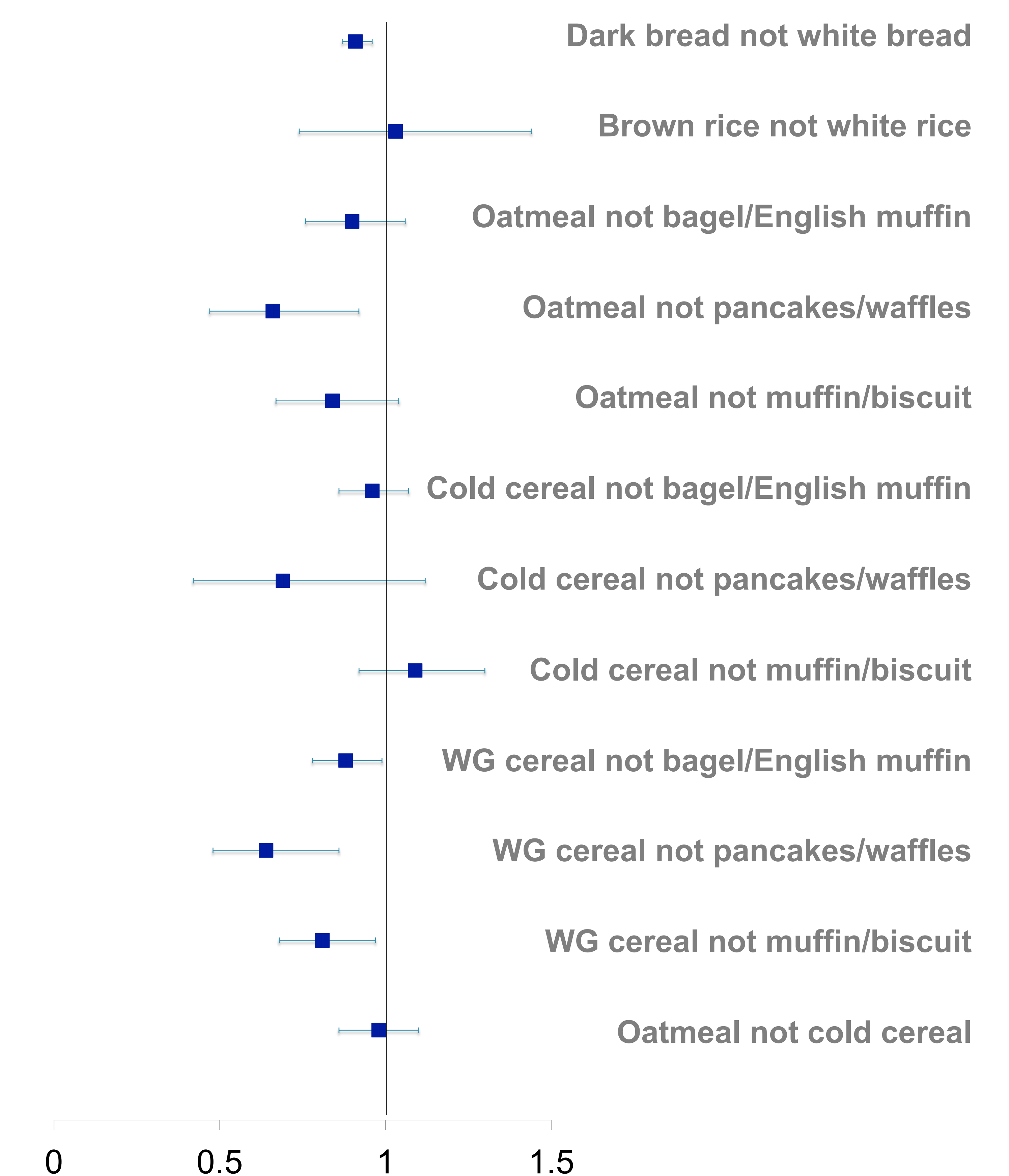
Table 2. RR (95% CI) for CHD according to cold cereal whole grain content.

Daily servings	HPFS		NHS		Pooled	
	< 0.5	≥ 0.5	< 0.5	≥ 0.5	< 0.5	≥ 0.5
<i>Whole grain cereal (≥16g/serving)</i>						
Model 1	1.00 (ref)	0.86 (0.79 - 0.92)	1.00 (ref)	0.82 (0.75 - 0.90)		
Model 2	1.00 (ref)	0.93 (0.85 - 1.00)	1.00 (ref)	0.90 (0.82 - 0.99)	1.00 (ref)	0.91 (0.86 - 0.97)
<i>Refined grain cereal (<16g/serving)</i>						
Model 1	1.00 (ref)	1.05 (0.92 - 1.19)	1.00 (ref)	1.11 (0.97 - 1.27)		
Model 2	1.00 (ref)	1.05 (0.93 - 1.19)	1.00 (ref)	1.13 (0.99 - 1.29)	1.00 (ref)	1.09 (0.99 - 1.19)

Model 1: adjusted for age and total energy

Model 2: model 1 + smoking, alcohol, family history of MI, physical activity, aspirin use, BMI, hypertension (baseline), hypercholesterolemia (baseline), diabetes (baseline), and saturated fat intake

Figure. Pooled HR (95% CI) for CHD associated with the replacement of one serving of specific grain products.



WG = whole grain cereal (≥16g/serving)

Conclusions

- Replacing refined grains with whole grains is associated with a lower risk of CHD
- This benefit accrues across a wide range of foods